‘Design: Our Future’

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Design: Our Future, was an important and exciting call to arms for Queensland Design and Technology teachers at the INTAD State Conference 2015 held at Harristown State High School Toowoomba on the 25 June. As the Australian Government increasingly recognises design thinking as “a ubiquitous capability for innovation” (Commonwealth of Australia, 2013:90) to support a viable manufacturing sector in the Asian century, this represents an opportunity for Design and Technology teachers to provide leadership in the cultivation of these generic skills, behaviours and mindsets through secondary school education in Australia.

Education for the Creative Knowledge Economy

We are all aware that over the past two decades, during which time Manual Arts curriculum in Queensland has changed to a Design and Technology education foci, our society has been transformed. The impact of the globalisation of economies, along with the rapid development of information and communication technologies (ICTs), has seen societies transition from “the post-industrial economy to the information economy to the digital economy to the knowledge economy and now the ‘creative economy’” (Peters and Araya, 2010:xx), in which ideas and knowledge function as commodities (Anderson, 2008). A consequence of this transition has been the transformation to a ‘creative workforce’, from labour intensive to flexible, networked and multi-skilled. It has become imperative for individuals and organisations to continuously evolve, learn, create and apply knowledge, to participate in lifelong learning (Bentley, 1998) in preparation for jobs and markets that do not yet exist.

Bakhshi, Frey & Osborne (2015) in a recent UK ‘creativity vs. robots’ discussion, acknowledge that growing literature suggests that the digitisation of the economy is likely to further increase the demand for creative skills and that creative occupations will be much more resistant to an expanding scope for displacement through automation. According to Frey and Osborne (2013:20), the following pursuits will obstruct the computerisation of human labour:

(1) “when perception and manipulation are important in complex and unstructured environments” where automating human tasks is difficult;
(2) “where novelty is valued”; and
(3) “where tasks involve high degrees of social intelligence” eg. Tasks such as negotiation, motivation and persuasion to ensure successful collaboration and teamwork.

In order to cultivate these fundamental and enduring creative and digital skills, *Manifesto for the Creative Economy* (Bakhshi, Hargreaves & Mateos-Garcia, 2013: 7) forewarns that the UK education system needs to take a more multi-disciplinary approach to curriculum that fuses artistic interests, technological innovation and entrepreneurial energy, favouring a cohesive STEAM (science, technology, engineering, arts and mathematics) interdisciplinary learning paradigm over a STEM focused one. Similarly, Waldrip, et.al. (2014:1-3) in their assessment of sustainable regional education in Australia, also concede this, supporting personalised learning environments incorporating socio-cultural factors, with a focus on the largely ignored affective (rather than cognitive) domain, addressing values, attitudes and behaviours.

Why is design important?

If we understand design as the link between creativity and innovation, design is now being identified as a form of knowledge-based capital that can be used to drive innovation and growth. Design thinking and design-led innovation are increasingly used globally to provide new strategic approaches to business innovation and culture, and in education systems to unite the academic and vocational. It is a significant domain of activity, which requires new practices to educate future generations of consumers and ‘prosumers’, who are “designers by persuasion but not profession” (Cope & Kalantzis, 2010: 597).

In creating aspired value for others, designers exercise an 'open' and complex productive reasoning pattern of 'Abduction-2', focused on only the end value to be achieved without knowing the 'how' or the 'what', and therefore reliant on both the creation of a 'working principle' and a 'thing' (object, service, system) in parallel. This is fundamentally different to the reasoning in fields predominantly based in analysis (deduction, induction) and conventional problem solving or 'Abduction-1', which creates only the 'what'. However, design also builds upon induction, problem solving and analytical reasoning (Dorst, 2011, p.525). Designers also engage in reflection-in-action rather than reflection-on-action, a specific type of reflective practice that helps them to deal well with situations of uncertainty, instability, uniqueness and conflicted values that are inherent in ill-structured problems (Guindon, 1990).

Zande (2010) proposes that design is a viable part of K-12 curriculum in a creative knowledge economy to achieve cultural, pedagogical *and* economic aims, and suggests (2011, p.28) that the design process is consistent with several current notions about effective practices for educating K-12 students: "using theme-based and interdisciplinary instruction, fostering self-direction and independence, teaching topics relevant to the learner, using group interaction, promoting student discovery, and encouraging critical and creative exploration of ideas".

Beckman and Barry (2007) claim that the embedding of design thinking incorporates all four phases of an ideal learning cycle – experiencing, reflecting, thinking and acting. They advocate for the value of innovation as an experiential learning process of "problem finding/problem selecting, solution finding/solution selecting, or story-telling" (2007, p.47). Rather than focusing on problem solving, the innovation process places equal importance on identifying, framing and reframing the problem to be solved. It is also a learning cycle that draws upon the four learning styles of (i) diverging, (ii) assimilating, (iii) converging and (iv) accommodating, allowing the learner to experience their learning style preferences through a process of "creative abrasion" (Leonard & Strauss, 1997). This is the assembly of 'whole-brained' teams structured to maximise cognitive diversity and minimise entrenched thinking, and gain an understanding and empathy for the different personalities and the collaborative dynamics required to achieve innovation.

As a potential metadiscipline and a process of meaning making, design is often viewed as the most appropriate tool in which we can better understand the processes of change and becoming capable of change-making (Kimbell & Perry, 2001). A group of 10 education academics from the United States, Australia and Great Britain, propose the conceptual framework of design as a "pedagogy of multiliteracies" (The New London Group, 1996; The New London Group, 2000), which enables students to negotiate the increasing cultural and linguistic diversity in this rapidly changing world. The interwoven components critical to this pedagogy are:

- Situated Practice – Building upon the tradition of experiential learning, immersion in meaningful practices within a community of learners (including experts or expert novices and extra school communities) in a setting in which the learners are motivated, and feel psychologically and physically comfortable and secure about taking creative risks and being guided by both peers and teachers/mentors.
- Overt Instruction – Providing supplemental active interventions to scaffold complex learning activities and introducing explicit information and conceptual language at times to guide and organise actions
- Critical Framing – Constructively critiquing in relation to their social and cultural context through reflection and evaluation
- Transformed practice - Building upon traditions of applied learning, or learning by doing, in which learning occurs through a process of transfer of generalisable knowledge from one setting to another

This pedagogy emphasises the power of learning environments that:

- "Offer and encourage multimodal expressions of meaning: *linguistic, visual, audio, gestural and spatial;*
- Use varied and appropriate higher order thinking skills and knowledge processes: *experiencing, conceptualising, hypothesising, analysing and applying*;

- Focus on diversity amongst learners and growing knowledge as a process of *belonging* and *transformation"*
  (Yelland, Cope & Kalantzis, 2008, p.201)

The framework compliments and extends existing state-based curriculum frameworks and provides a context for creating crossovers to other ways of conceptualising learning, pedagogies and curricula, including Bloom's Taxonomy (Bloom, 1956), Multiple Intelligences (Gardner, 1983) and Habits of Mind (Costa & Kallick, 2000).

Implications for Design and Technology Teachers

Design education has been posited (Wright & Davis, 2014) as a framework to deliver on the 21st century competencies required for the three defining features of the creative knowledge economy – Innovation, Transdisciplinarity and Networks (Hearn and Bridgstock, 2010) (Refer Figure 1). In order to leverage human capital, it requires teachers to facilitate the development of capabilities in innovation at the intersection of Scientific/Technical, Creative/Cultural, and Business knowledge regimes, in which the third translates the new knowledge produced by the first two, into valued and consumed commodities**.** Students need to be able to combine, generate and communicate this transdisciplinary knowledge, organised via multi-pathed, complex and flexible social networks. In addition, capability building in domain specific creativity in the scientific/technical and creative/cultural areas is essential (2010, p. 96-97).

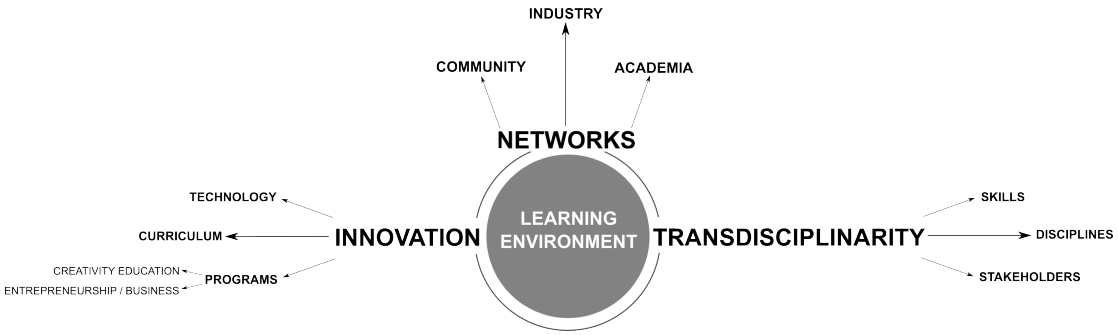

Figure 1: Learning Environment Model (Wright and Davis, 2014: 53)

In order to achieve this, Design and Technology teachers and their associations need to work more closely with universities, to generate new cross sector strategies, systems and policies for educational innovation, through the documentation of ongoing action research. Conversely universities, alongside government, QCAA, training providers and cultural institutions such as SLQ's Asia Pacific Design Library *Design Minds* program, will need to support transition through pre-service and in-service teacher training and professional development programs, which facilitate engagement with design and entrepreneurship at a curriculum level, in and beyond the classroom, as well as through online community networks in regional areas. An example of this is *The STEAM Room* project http://www.stepup.edu.au/steam-room/ as part of a larger Australian Government OLT grant funded project called *StepUp*.

Preparing creative citizens for the 21st century also requires Design and Technology teachers to move away from a focus on explicit knowledge and static curricular units towards more 'connected learning' (Ito et al., 2013) involving ICTs and rich media, social learning and more authentic forms of assessment. It also involves embracing the significance of informal learning approaches, in which the individual passively over time curates either face-to-face or online social sources of information, underpinned by self-motivation and curiosity. Design immersion programs, and competitions such as F1 in Schools, as documented in the *Knowledge Economy Market Development Mapping Study* (Wright, Davis & Bucolo, 2013) encapsulate the affordances of these approaches.

Much of the required skill and knowledge base required in the Design and Technology subject area is tacit, procedural and/or metacognitive, and is therefore best learned in a situated and authentic context rather than a decontextualised classroom, in order for learners to attain real

depth of learning and transference to relevant contexts. It is important that teachers foster opportunities for students, which reach out beyond the traditional classroom scenario and involve the mentorship of tertiary design students, professional designers and industry representatives to highlight career pathways. A *Design Minds* toolkit entitled *School and Community Partnerships* (The Smith Family, 2014) has been designed to assist with this.

The Challenges

One of the key challenges Design and Technology teachers face is integrating new digital technologies in the educational space and navigating the abundance of a wide range of learning resources on any topic freely available to use and share online. This is less formidable if tackled as a 'guide on the side' rather than a 'sage on the stage', to facilitate the filtering and re-contextualisation of new sources of knowledge with a view to scaffolding lifelong learning.

In step with the change in name to DATTA, with a perceived greater emphasis on 'Design', the teacher association remains critical to the facilitation of professional development opportunities delivered in conjunction with the cultural institutions, universities, member schools and national networks, providing a supportive network of peers who share teaching strategies and outcomes. Common with issues I have identified in my own tertiary design learning environment, teachers I talked to during the conference workshops referenced a need for support around the challenges of encouraging divergent experimentation, risk-taking and confident use of manual visual communication tools.

Fundamentally, in order to ensure that our future workforce is not superceded by robots, we must develop and co-create curriculum for capacity building, which enables communication of novel solutions to complex and unstructured tasks, and embraces informal learning networks to ensure successful participation and collaboration with our local industries and situated communities of practice. I hope that SLQ's *Design Minds* platform can provide some support to DATTA teachers in the future, in documenting responses to this changing paradigm, with the view to developing evidence-based research on the importance of design to our future.

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Notes on Contributor

Natalie Wright was the keynote speaker at the INTAD State Conference on the 25 June, 2015 at Harristown State High School, Toowoomba. She is a Lecturer and PhD candidate in the QUT Faculty of Creative Industries, School of Design, with 18 years commercial practice background in Interior Design. She has served as a National Director of the Design Institute of Australia, and is currently Manager, SLQ Asia Pacific Design Library (APDL). Natalie's research is focused around community engagement and service learning, and design led innovation approaches in the secondary school and tertiary education contexts which develop generic capabilities required for the 21st century creative knowledge economy. Her research on Queensland design education programs has been published in international journals. Since 2010, she has been involved in the development and facilitation of over 25 state and local government funded design workshop programs for school students and teachers, and as a member of the project delivery team for the SLQ APDL *Design Minds* website. In 2013, she co-authored the Arts Queensland funded *Knowledge Economy Market Development Mapping Study*, highlighting the scope and value of design education programs in Queensland, from primary school to the professional design sector.